The Influence of Tag-Along Rights on Companies' Value: an Event Study by using the Brownian Motion Model

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Abstract: The aim to this work is to verify the effect of Tag-Along right's concession to the shareholders by analyzing the behavior of the shares returns. For that, event studies have been made for a group of 21 companies' shares, which have given such right to their shareholders after the law 10.303 from October 2001. In the tests, we have used four models in order to estimate the abnormal returns: adjusted to market, adjusted to risk and market, and the Brownian motion. The results of the tests based on these four models were contradictory. The statistic models did not capture the abnormal returns, whereas the Brownian motion model, a financial-economic model, show us that the Tag Along affects the pattern of daily return of the companies listed in BOVESPA' shares. Such result was expected due to the new corporate governance practices used by companies in Brazil.

1 Introduction

Corporate Governance is a theme that has attracted a lot of attention, since we know that differences in this ambit have an impact on companies' value and, consequently, on shareholders' wealth. La Porta (1998)'s work, which is a classic, indicates that the level of protection for the minority group is reflected in the share price, i.e., the rise of the level of rights offered to the minority group increases the company's value. Tag Along is one of the rights that can be offered to minority shareholders and we can define it as the minority shareholders' right to receive for their shares, in case of a selling or capital closure of the company, an amount of money that has as a reference the amount paid to the majority shareholders. Thus, Tag Along is a way of alignment within the interests of the different partners in a company.

In Brazil, as in other markets, there has been a movement in favor of the good Corporate Governance practices. Brandão (2003) talks about the emergence of a national movement for corporate governance citing a series of facts that have given evidence to it. The first one is the reformulation of the Stock Companies law (Law 10.303 from 31/10/01), which aimed at bettering the protection for the minority group. The second one is the launching of new dealing segments in Bovespa, with Corporate Governance levels I and II. The third fact refers to the launching of the Capitals Market Director Plan in 2002 approved and subscribed by a group of entities of the market. The Incentive Plan to the Adoption of Corporate Governance Practices from BNDES is the fourth fact cited by the author. The fifth fact is the preoccupation with the group of people interested on companies, named stakeholders, manifested by several market participants. The last fact that supports the author's thesis is the emergence of proposals for the creation of a Corporate Governance Code derived from entities such as CVM – Monetary Values Comission and IBGC – Brazilian Institute of Corporate Governance.

In such environment, it is licit to question whether these Corporate Governance practices are considered value adding by shareholders in Brazil. This work tries to answer such question partially. In Brazil, several companies listed in Bovespa have given the tag-along right in the last months. We want to identify if there has been an alteration in the value of the companies due to the concession of such right, i.e., if the shareholders see it as something valuable.

2 Theory

When looking for an economic explanation for the existence of deals between shareholders, where we can add the Tag Along right, Chemla, Habib and Ljunggvist (2002) show that they are built with the purpose of avoiding renegotiation in an environment where the companies' value depends on investments and on mechanisms for wealth transference between shareholders. Shareholders' deals preserve the incentives so that investments be made and transferences between shareholders be minimized.

Still on the ambit of conceptual discussion, Rabelo and Coutinho (2001) argue that the enhancement of the Corporate Governance practices is fundamental for the development of the capital market and that the successive crises through which the country has gone in the last 20 years have somehow hardened the development of these practices. They also show that the control of companies in Brazil is exerted by a few shareholders and that the protection to minority shareholders must be one of the objectives to be striven for by regulatory organs, and furthermore, that this is one of the factors that might raise the internal financial level available to companies.

Several empiric studies trying to identify the impact of alterations to minority shareholders' rights in the company's value have been made in Brazil in the last years.

Ribeiro Neto and Famá (2001) study the impact do the New Stock Companies Law (replacing the Law 6404/76) approved by the Deputies' Chamber on March 28, 2001. This replacement altered some terms of the in vigor Law, such as the proportion between common and preferred shares, which used to be 2/3 for preferred and became 50%. The article that described the evaluation of the shares in case of a recess or capital closure was also altered, favoring the economic evaluation of the shares. Moreover, the Tag Along right of 80% from amount of money paid for the shares of the controlling block in case of company's alienation is inserted in this replacement. By using the Event Study methodology about the difference in the prices between common and preferred shares from 35 companies, and supposing that the new legislation benefit the common shareholders, the authors conclude that *"The common shares had a valorization of 12,3% on average, whereas the preferred shares lost, on average 0,4% of their value. 77% (27) of the studied companies have some kind of valorization on its common share. On the other hand, approximately 51% (18) of the companies faced a fall on the value of their preferred share. As the data show, common shares had an 8 times bigger increased on their value. .... Nevertheless, it becomes clear that the market has been reacting to the changes that may occur due to the new legislation*".

Carvalho (2003) studies the effect of the migration of 22 companies to Bovespa levels I and II, analyzing the impact of such migration on the price, volumes and liquidity of the companies. The author argues that the voluntary adherence to Corporate Governance regimes with more protection to minority shareholders is an alternative to the imposition of legal rules, since they face the resistance from economic groups that have got companies' control, as the control value will fall with the imposition of higher protection to the minority group. The author finds a positive effect on the companies' value, i.e., there is a positive abnormal return in the entire event window. However, it is not possible to determine the magnitude of this abnormal return, since the duration of the event window is not clear. The author also verifies that there has been an increase on the negotiated value, an increase on the liquidity and a reduction on the sensibility to macroeconomic factors. In short, the migration to the Corporate Governance Bovespa levels I and II has benefited the shareholders from these companies.

Saito (2003) analyzes the determinants of the difference between common and preferred shares' prices of 53 companies listed in Bovespa, selected through criteria associated to its liquidity. One of the highlighted aspects in this study refers to impact that was observed when the law 9457 removed the tag-along right in May 1997 and its return in law 10.303 in October 2001 (the same studied by Ribeiro Neto and Famá (2001) still as a replacement). The result of the analysis confirms the importance of the conceived rights to minority shareholders, since the prize for the right to vote alter significantly in both events, always in the sense expected by the theoretical framework.

It is important to emphasize that the empiric studies about Corporate Governance realized until now in Brazil used as event general occurrences, as the approval of a new law or the migration for the Corporate Governance levels. In this work, we propose the study of an specific event: the incorporation of Tag Along by each of the companies in the sample.

3 Methodology

We have used, in this work, the event study technique for the evaluation of the Tag Along effect on the shares' prices and returns of the companies from the sample.

The event study technique comes from the hypothesis that a certain fact, or event, affects the company's value, and that this change on the value is reflected in an abnormal return in the company's shares. So, the concept of abnormal return is one of the most important in event study. Taking into account that the prices of the company's shares and the market are all the time subject to a wide variety of factors, we need to choose an appropriate reference index so that we can control the effects of the facts non-related to the event that is being studied.

We can define the empiric model of the returns of the company's share, for the periods in which the event did not occur, as follows:

$$R_{it} = B_t.\beta_i + \varepsilon_t$$

where

R_{it} = is the return of the share i in the period t;

B_t = is the vector of independent variables, e.g., the return of the market portfolio in date t;

β_i = is the vector of parameters, e.g., beta of the share i in relation to the market portfolio; and

ε_t = is the random term of zero mean.

For the periods in which the event occurred, the empiric model is as follows:

$$R_{it} = B_t.\beta_i + FG + \varepsilon_t$$

where

F = is the vector of characteristics of the company influencing the event impact in the procces of the share's return;

G = is the vector of parameters measuring F's influence on the occurrence of the event.

In order to capture the change of the returns empiric model, we have used the procedure suggested by Campbell, Lo and MacKinlay (1997), who describe the main steps of the study process of the event impact on the returns of the company's shares, such as: definition of the event; selection of the sample; measuring of the returns of the sample; estimation procedure; test procedure; empiric results; interpretation and conclusion.

In this work we have defined as event the date of the Tag Along's approval in the shareholders general extraordinary or ordinary meeting after the Law 10.3030 from October 31, 2001.

We found 37 companies in the Brazilian market that fitted the definition of event. Nevertheless, we limited the study to the shares that were negotiated during a 22-day period after the date of the event, and 102 days before it, necessary for the estimation of the models' parameters and tests. So, the sample for this paper is composed of the following 21 shares, negotiated at BOVESPA, and respective companies:

Name	Code	Tag-Along's Date	Tag-Along Common %	Tag-Along Pref %	Listing Segment
Bco Itau Holding	**ITAU4**	30/4/2002	80	80	Level 1
Bradesco	**BBDC3**	17/12/2003	80	100	Level 1
	BBDC4	17/12/2003	80	100	Level 1
Banco do Brasil	**BBAS3**	7/6/2002	100	-	Traditional
	BBAS4	7/6/2002	100	-	Traditional
Braskem	**BRKM5**	16/8/2002	100	100	Level 1
Celesc	**CLSC6**	17/6/2002	100	100	Level 2
Coteminas	**CTNM4**	21/8/2002	80	80	Traditional
Duratex	**DURA4**	16/12/2002	80	80	Traditional
Eternit	**ETER3**	27/12/2002	80	80	Traditional
F Cataguazes	**FLCL5**	14/2/2003	80	80	Traditional
Gerdau	**GGBR4**	30/4/2002	100	100	Level 1
Itausa	**ITSA4**	29/4/2002	80	80	Level 1
Marcopolo	**POMO4**	21/8/2002	100	80	Level 2
Net	**PLIM4**	2/5/2002	100	100	Level 2
Perdigão	**PRGA4**	17/12/2002	80	80	Level 1
Randon Part	**RAPT4**	10/12/2002	80	80	Level 1
Rhodia-Ster	**RHDS3**	23/4/2002	80	80	Traditional
Sabesp	**SBSP3**	18/4/2002	100	-	New Market
Ultrapar	**UGPA4**	22/3/2002	100	100	Traditional
Weg	**ELMJ4**	18/11/2002	80	80	Level 1

Table 1. Shares and companies which compose the sample, the dates of the events, kinds of Tag Along, and listing segment of the share at BOVESPA.

The source of data for price quotations was the system Economatica, and the source of information of Tag Along and companies was BOVESPA and the system Economatica.

We noticed that during the year 2002, after the Law 10.303/01, the companies gave, or restituted, the Tag Along right to their shareholders, and most of them are included in differentiated listing segments at BOVESPA (Level 1, 2, and New Market) in relation to their concern about Corporate Governance.

In an event study we need to establish a period of time in which data will be used to estimate parameters of the used models, what we named estimation window. Besides it, we defined a round period to test the event in the chosen model, what we named event window. We adopted and estimation window composed of 80 daily observations of quotations or returns of shares. The event window can be composed of 22, 11, or 5 anterior or posterior to the date of the event.

We want to test the abnormal returns significance in a period round the date of the event, or test the null hypothesis that the abnormal returns expected value accumulated in the period is zero. In order to continue the study, we firstly estimated the abnormal returns, *ex-post*, which can be obtained through the difference between the observed company's returns in the period and the expected company's return supplied by a reference model. The abnormal returns estimation models can be divided into two big categories: statistic models, which do not depend on financial-economic argumentation; and financial-economic models.

Brown and Warner (1980, 1985) cite the main statistic abnormal returns estimation models: models adjusted to the mean; models adjusted to the market; and models adjusted to risk and market. Kloeckner (1995) shows that the three statistic models present similar results in the abnormal returns estimation.

Campbell, Lo and MacKinlay (1997) present the main financial-economic models, which are based in pricing models such as CAPM (*Capital Asset Pricing Model*) or APT (*Arbitrage Pricing Theory*). Minenna (2002) presents, in a study about *insider trading*, a probabilistic model based on the geometric Brownian motion for abnormal returns estimation, which we will, from now on, call Brownian motion model.

In this work we will estimate the abnormal returns using the model adjusted to the market, the one adjusted to risk and market, and the Brownian motion model. The Brazilian stock market in this study will be represented by the closing quote of Brazil Index (IBrX), calculated by BOVESPA and composed of the 100 most liquid shares of the market.

In the model of adjusted to the market returns, the abnormal returns are estimated by the difference between the share return and the market portfolio return in the same period. So, the abnormal returns in the analyzed period are determined for each share. Therefore, the share abnormal return "i" in a date "t" is given by:

$$AR_{it} = R_{it} - R_{mt}$$

where

AR_{it} = abnormal return of the share i in date t;

R_{it} = return of share i in date t;

R_{mt} = return of market in date t.

The daily returns are obtained by the daily closing quotations of the shares prices that compose the sample, and calculated as follows:

$$R_{it} = \ln(P_{it}) - \ln(P_{it-1})$$

where

R_{it} = return of share i in date t;

P_{it} = closing quotation of the price of share i in date t.

The model of adjusted to risk and to market returns has as a premise the fact that shares' abnormal returns are observed by the difference between observed individual returns and returns calculated through a simple-factor model. The simple-factor model is estimated by using the data of the estimation window, and a linear regression by means of ordinary least squares. Therefore, the abnormal returns are given by:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt})$$

where

AR_{it} = abnormal return of share i in date t;

R_{it} = return of share i in date t;

α_i = linear coefficient of the regression of share i in relation to the market return;

β_i = angular coefficient of the regression of share i in relation to the market return;

R_{mt} = return of market in date t.

The Brownian motion model, by Minenna (2002), presuppose that the shares' prices follow a geometric Brownian movement, and that in the event window these prices float in a range that varies according to the Brownian motion parameters (tendency and variance) and the time. A differential stochastic equation of the Brownian geometric motion is:

$$dS_t = \mu S_t dt + \sigma S_t dW_t$$

where

dS_t = differential of the share's price in date t;

μ = drift, or instantaneous return of the share;

S_t = share price in date t;

dt = differential of share price in date t;

σ = instantaneous standard deviation of the share returns;

dW_t = differential of the standard Wiener process with mean 0 and standard deviation 1.

By applying Itô's lemma to the process above, we have:

$$S_{t+h} = S_t \exp\left(\left(\mu - \frac{\sigma^2}{2}\right)h + \sigma(W_{t+h} - W_t)\right)$$

where

h = time interval;

μ = drift, or instantaneous share return;

S_t = share price in date t;

σ = instantaneous standard deviation of share returns;

W_t = standard Wiener process with mean 0 and standard deviation 1.

Upon the definition of the process that command the share price, we estimate the prices interval, in which the share price would normally float in each date, taking into account a certain level of confidence, as follows:

$$\Delta\hat{S}_{it} = \left[\bar{S}_i e^{\max}, \bar{S}_i e^{\min}\right]$$

$$\max = \sigma . z_\theta \sqrt{t} + \left(\mu - \frac{\sigma^2}{2}\right)t$$

$$\min = \sigma(-z_\theta)\sqrt{t} + \left(\mu - \frac{\sigma^2}{2}\right)t$$

where

$\Delta\hat{S}_{it}$ = range of prices of the share i in date t;

$\bar{S}_i$ = average price of share i estimated in the estimation window;

z_θ = value of the density function of a normal standard distribution;

θ = probability through which we find the share price in the specific band.

After we have estimated the range of prices in which the share must be in a date of the event window, the abnormal return is estimated by the formula:

$$AR_{it} = \frac{\max imum\left[0, \text{signal}\left(S_{it} - \bar{S}_i e^{\max}\right)\text{signal}\left(S_{it} - \bar{S}_i e^{\min}\right)\right]\min imum\left[\left|S_{it} - \bar{S}_i e^{\max}\right|, \left|S_{it} - \bar{S}_i e^{\min}\right|\right]}{\bar{S}_i}$$

where

AR_{it} = abnormal return of share i in date t;

signal = function that gives the value +1 (-1) if the content if positive (negative);

max *imum* = function that gives the higher value between 2 values;

min *imum* = function that gives the lower value between 2 values;

S_{it} = price of share i in date t.

In this model, for a share return to be considered abnormal, it must be out of the specific range, which grows each passing day in the event window.

In order to estimate the abnormal returns, we must firstly estimate the parameters of the Brownian geometric motion, and for that, we begin with the discretization of the movement:

$$u_{t+1} = \ln\frac{S_{t+1}}{S_t} = \left(\mu - \frac{\sigma^2}{2}\right)\Delta t + \sigma\sqrt{\Delta t}\,\varepsilon_t$$

where

ε_t = realization of a shock at random.

This discretization can be rewritten as follows:

$$u_{t+1} = \ln\frac{S_{t+1}}{S_t} = M + \sqrt{V}\varepsilon_t$$

where

$$\mathrm{M} = \left(\mu - \frac{\sigma^2}{2} \right) \Delta t; \text{ e, } \mathrm{V} = \sigma^2 \Delta t$$

Thus we come to the unbiased estimators of the parameters of the Brownian geometric motion, obtained through the data from the estimation window, and taking into account 1-day intervals:

$$\hat{\sigma}^2 = \frac{\hat{\mathrm{V}}}{\Delta t}; \text{ e, } \hat{\mu} = \frac{1}{\Delta t} \left(\hat{\mathrm{M}} + \frac{\hat{\mathrm{V}}}{2} \right)$$

where

$$\hat{M} = \frac{1}{T} \sum_{t=1}^{T} u_t = \bar{u}; \text{ e, } \hat{V} = \frac{1}{T-1} \sum_{t=1}^{T} (u_t - \bar{u})^2$$

Finally, we will take into account a third alternative to statistically model the shares returns of the companies chosen for this study and, consequently, to present an alternative to the proposed studies. Such alternative consists in supposing that the shares' log-returns follow an stable distribution, also knows as Lévy-Pareto's distribution or *Lévy Flights*. The motivation for the inclusion of these distributions, instead of limiting ourselves to the Gaussian distribution, lies with the fact that log-returns distributions typically present heavy tails, what results in discontinuities on their trajectory. There are other ways to approach the issue of the heavy tails, such as using the well-known t distribution or supposing that the returns follow a process with a jump, or *jump process*, which consists in using Poisson's distribution. The disadvantage of the last alternative lies with the fact that its use results in a high number of discontinuities in the log-return process, unlike what happens when stable distributions are used. In fact, the use of stable distributions have proved useful in financial modeling, possibly due to de variety of elements that compose this parametric family of distributions, which includes the Gaussian distribution by Cauchy and Pareto. The restrictions to stables distributions are essentially two: the difficult of dealing with this family, because, as we will see, they are defined by its characteristic functions, and, in second place, such distributions (except for the Gaussian) have infinite variance. The last restriction is usually eliminated by considering truncated versions of stable distributions (*Truncated Lévy Flights),* or distribution t, or some mixture of Gaussian distributions.

A distribution F is stable if given X_1, ..., X_n and X independent random variables with distribution F, there are constants $c_n > 0$ e γ_n so that $X_1 + ... + X_n$ and $c_n X + \gamma_n$ are the same in distribution and F is not concentrated in the origin. If $\gamma_n = 0$, so we say that F is strictly stable.

In relation to constant c_n, we know that it must satisfy the equation $c_n = n^{1/\alpha}$ for $0 < \alpha \leq 2$. The coefficient α is called characteristic exponent of the distribution and is the main parameter to be estimated when dealing with stable distributions. Furthermore, it can be indicated (see Feller, W. (1971)) that X has a stable distribution as long as if there are constants $\gamma > 0$ e δ and a random variable Z whose characteristic function is given by:

$$Ee^{iZu} = \exp\left\{ -|u|^{\alpha} \left[1 - i\beta \tan\frac{\pi\alpha}{2} \cdot \mathrm{sgn}(u) \right] \right\}$$

if $\alpha \neq 1$ and

$$Ee^{iZu} = \exp\left\{-|u|\left[1 - i\beta\frac{2}{\pi}\cdot\text{sgn}(u)\cdot\ln|u|\right]\right\}$$

if $\alpha = 1$, where $0 < \alpha \leq 2$ e $-1 \leq \beta \leq 1$, so that X and $\gamma\left(Z - \beta\tan\frac{\pi\alpha}{2}\right) + \delta$, if $\alpha \neq 1$, or $\gamma Z + \delta$, if $\alpha = 1$, have the same distribution. Parameters γ, δ, α and β represent the scale, the location, the kurtosis and the skewness of the distribution, respectively. For certain values of α, the expectation of a random variable is well defined and its expression is known: if $1 < \alpha \leq 2$, the expectation of the random variable X with stable distribution and parameters γ, δ, α and β is given by

$$\mu = EX = \delta - \beta\gamma\tan\frac{\pi\alpha}{2}.$$

Possibly, the biggest difficulty of working with stable distributions is that one cannot always invert the formulas above so that an expression for the probability density function be analytically determined. That is, in the vast majority of the cases it is necessary to fall back upon numerical analysis and, consequently, to the demand for a considerable computational effort. However, in some particular cases, it is possible to analytically determine the expression for the probabilities density. For instance, the distribution is:

- Gaussian if $\alpha = 2$;
- Cauchy if $\alpha = 1$ and $\beta = 0$;
- Lévy-Pareto if $\alpha = 1/2$ e and $\beta = 1$.

Thus, the main source of difficulties when estimating the distribution parameters is a problem in the inversion of the characteristic function. Even so, there are some available methods to estimate them, among which we adopted the one elaborated by Nolan (see Adler, R. J., Feldman R. E., Taqqu, M. S. (1998)). In this method, the parameters are estimated by maximum verisimilitude and the results of this article were offered by the program STABLE.EXE, also developed by Nolan, which numerically maximizes the verisimilitude (it can be obtained at the website http://academic2.american.edu/~jpnolan/).

In order to carry the event study, we will take into account, in this case, the models of constant mean returns. In fact, this choice is not an exaggerated simplification when compared to other models, for instance, the market one. That is because, as argued by Campbell, Lo and MacKinlay (1997), the model of constant mean returns offers, in general, results similar to those from more sophisticated models. Consequently, we define abnormal return as:

$$AR_{it} = R_{it} - \mu$$

where t indicates the time and goes through the event window, R_{it} is the return of asset i in date t and AR_{it} is the abnormal return of asset i in date t.

Once the abnormal results have been obtained, through each of the four models above, we must standardize them, calculate the accumulated abnormal returns and based on them we get to statistic t, which makes it possible for us to test the significance of the obtained results.

4 Obtained Results

The methodology has been employed for the shares in the sample, taking into account the 3 abnormal return models presented, for event windows of 22, 11 and 5 negotiation days anterior and posterior to the event date. For the Brownian motion model, we considered a confidence level of 95%, which is used to determine the prices range. In all the cases the estimation window was composed of 80 negotiation days anterior to the event window.

Due to space limitation, we will only present the tables with the general aggregation results of the shares returns in the sample in the entire period of the event window. The return aggregation of each individual share, and of the shares from the sample, for each date in the event window separately, did not generated accumulated abnormal returns values statistically significant for the models adjusted to market, adjusted to risk and market and when supposing a stable distribution for its returns. A possible reason for that is the size of the sample, 21 shares only, what has been a limit for this study. The grouped results for each sort of model and event window size are in the tables below:

	Model			
Grouping of window and shares	**Adjusted to Market**	**Adjusted to Risk and Market**	**Brownian Motion**	**Stable Distribution**
Medium CAR	-0,0381%	-0,0711%	9,8659%	-4,3700%
Standard Deviation of Medium CAR	0,6423%	0,6158%	2,0976%	25,5269%
Statistic-t	-0,0594	-0,1155	4,7034	-0,1712
Value-p of test t	95,26560%	90,80245%	0,00026%	86,40728%

Table 2. Results of abnormal returns grouping between shares and negotiation days in the anterior and posterior 22-day event window.

	Model			
Grouping of window and shares	**Adjusted to Market**	**Adjusted to Risk and Market**	**Brownian Motion**	**Stable Distribution**
Medium CAR	-0,0260%	-0,0472%	11,1223%	1,5969%
Standard Deviation of Medium CAR	0,5961%	0,6148%	1,6870%	27,6993%
Statistic-t	-0,0437	-0,0768	6,5930	0,0577
Value-p of test t	96,51752%	93,88062%	0,00000%	95,40272%

Tabela 3. Results of abnormal returns grouping between shares and negotiation days in the anterior and posterior 11-day event window.

	Model			
Grouping of window and shares	**Adjusted to Market**	**Adjusted to Risk and Market**	**Brownian Motion**	**Stable Distribution**
Medium CAR	0,1757%	0,2129%	11,3989%	-4,0959%
Standard Deviation of Medium CAF	0,6364%	0,6546%	0,6579%	112,5093%
Statistic-t	0,2761	0,3252	17,3262	-0,0364
Value-p of test t	78,25025%	74,50349%	0,00000%	97,09594%

Tabela 4. Results of abnormal returns grouping between shares and negotiation days in the anterior and posterior 5-day event window.

We noticed on tables 2, 3 and 4 above that the results of adjusted to market and adjusted to risk and market models are similar and consistent, as affirmed by Kloeckner (1995), and in the case of this article, these two models did not produce any significant result, thus we cannot reject the null hypothesis that the expected accumulated abnormal returns are equal zero. This conclusion is reinforced by the obtained results from supposing a stable distribution for the returns as it can be seen on tables 2 and 3. On the other hand, the Brownian model rejected this null hypothesis, and leads us to the conclusion that, for any of the three tested event windows, the Tag Along concession affects the returns of the company's shares. The results, supposing a 22-day window and stable distribution for the log-returns, are not conclusive due to the great oscillation of the accumulated abnormal returns, as it can be seen on table 4.

22-day Window	Percentage of the Prices Included in the Range Evolution				
Brownian Motion Model	97,5%	95,0%	90,0%	85,0%	80,0%
Medium abnormal return	8,199%	9,866%	11,753%	12,557%	13,277%
Standard deviation of medium AR	1,853%	2,098%	3,021%	3,001%	2,868%
Statistic-t	4,426	4,703	3,891	4,184	4,629
Value-p of test t	0,001%	0,000%	0,010%	0,003%	0,000%

Table 6. Results of the Brownian motion model abnormal returns grouping between the shares and the negotiation days in the anterior and posterior 22-day event window for the different price probabilities included on the estimated prices range.

11-day Window	Percentage of the Prices Included in the Range Evolution				
Brownian Motion Model	97,5%	95,0%	90,0%	85,0%	80,0%
Medium abnormal return	10,271%	11,122%	11,823%	12,616%	13,356%
Standard deviation of medium A	1,406%	1,687%	1,459%	1,334%	1,478%
Statistic-t	7,306	6,593	8,102	9,458	9,035
Value-p of test t	0,000%	0,000%	0,000%	0,000%	0,000%

Table 7. Results of the Brownian motion model abnormal returns grouping between the shares and the negotiation days in the anterior and posterior 11-day event window for the different price probabilities included on the estimated prices range.

5-day Window	Percentage of the Prices Included in the Range Evolution				
Brownian Motion Model	97,5%	95,0%	90,0%	85,0%	80,0%
Medium abnormal return	10,898%	11,399%	12,293%	13,036%	13,632%
Standard deviation of medium A	0,687%	0,658%	0,838%	1,064%	1,065%
Statistic-t	15,866	17,326	14,671	12,254	12,805
Value-p of test t	0,000%	0,000%	0,000%	0,000%	0,000%

Table 8. Results of the Brownian motion model abnormal returns grouping between the shares and the negotiation days in the anterior and posterior 5-day event window for the different price probabilities included on the estimated prices range.

We noticed that in tables 6, 7 and 8 we continued to reject the null hypothesis, for the entire event window and all the price probabilities of the range. When we reduced the probability of prices included in the range, we reduced its size, and the results are normally more significant. A reason for that is that more prices will be out of the band limited by the maximum and minimum estimated prices, and more returns will be generated.

5 Final Considerations

The purpose of the study is to analyze the effect of Tag Along right concession to the shareholders. For that, event studies were carried for a group of shares from companies that have recently given such right to its shareholders. We used **four** models to estimate the returns in the tests.

The results of the realized tests based on the four models were contradictory. The statistical models did not capture abnormal returns, while the Brownian motion model, a financial-economic model, showed us that Tag Along affects the pattern of daily return of the shares from companies negotiated at BOVESPA. This was the expected result due to the new Corporate Governance practices used by Brazilian companies.

The exigency of better Corporate Governance practices made by national financing organs, such as BNDES, and international ones, to approve better governance funds for investment, as well as greater limits to buy shares, made by pension funds, stimulated the companies listed at BOVESPA to give Tag Along, after Law 10.303/01 was divulgated.

The methodology of the Brownian motion, despite being more complex than statistical models, is interesting to be applied at event studies in general, as it does not relate the share return to the market return, but to its own behavior, besides considering that uncertainty, measure by volatility, increases in time.

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7 Attachments

We present next the tables with the main estimated parameters for the development of this study.

Shares' code	ITAU4	BBDC3	BBDC4	BBAS3	BBAS4	BRKM5	CLSC6	CTNM4	DURA4	ETER3
Alfa of Regression	-0,0005	-0,0017	-0,0028	0,0027	0,0011	-0,0024	0,0014	0,0038	0,0006	0,0058
Beta of Regression	0,7366	0,9244	1,1794	1,2566	1,3825	0,9341	0,9500	0,5811	0,3890	0,3465
Statistic t of beta	6,3985	7,2755	10,0462	6,1885	6,9049	5,5650	4,1579	3,3485	3,4054	3,0807
Value-p of beta	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00321%	0,08126%	0,06608%	0,20653%
Medium Price	0,16215	92,46678	114,87314	10,05195	0,01106	0,02247	0,52161	0,16030	0,03783	0,14173
Brownian mean	0,0332%	0,1333%	0,0884%	0,2555%	0,1287%	-0,3435%	0,2775%	0,3284%	0,1015%	0,6723%
Brownian standard deviatic	1,8328%	1,7044%	1,8391%	2,7762%	2,8445%	2,4775%	2,7804%	2,3085%	2,1870%	1,9706%

Table 9a. Estimated parameters for each one of the shares in the sample, considering the 22-day event window.

Shares' code	FLCL5	GGBR4	ITSA4	POMO4	PLIM4	PRGA4	RAPT4	RHDS3	SBSP3	UGPA4	ELMJ4
Alfa of Regression	0,0008	0,0005	-0,0026	-0,0010	-0,0069	-0,0021	0,0037	0,0083	0,0017	0,0041	0,0024
Beta of Regression	0,2546	0,9850	-0,2668	0,3839	1,5788	0,2863	-0,0136	0,5546	0,8956	0,4268	0,1666
Statistic t of beta	1,0500	5,3635	-1,2069	3,0025	6,3438	2,6377	-0,1140	1,3618	6,6394	3,3845	2,1145
Value-p of beta	29,37279%	0,00001%	22,74697%	0,26782%	0,00000%	0,83479%	90,92421%	17,32765%	0,00000%	0,07131%	3,44749%
Medium Price	0,00096	16,23074	2,90494	2,97373	6,91605	11,02678	0,00070	0,10494	0,10038	0,01584	2,02023
Brownian mean	0,2055%	0,1835%	-0,2812%	-0,0667%	-0,4875%	-0,1942%	0,4313%	1,0639%	0,3801%	0,5140%	0,2285%
Brownian standard deviatic	3,6157%	2,7716%	2,8953%	1,6815%	3,9438%	2,0174%	2,2461%	5,2791%	2,1747%	1,8569%	1,3736%

Table 9b. Estimated parameters for each one of the shares in the sample, considering the 22-day event window.

Shares' code	ITAU4	BBDC3	BBDC4	BBAS3	BBAS4	BRKM5	CLSC6	CTNM4	DURA4	ETER3
Alfa of Regression	0,0000	0,0000	-0,0015	0,0017	0,0028	-0,0018	0,0000	0,0040	0,0026	0,0057
Beta of Regression	0,6870	0,8814	1,0980	1,4018	1,3721	0,8100	0,8701	0,6759	0,4206	0,3581
Statistic t of beta	5,6707	6,0215	8,3111	6,5466	6,6138	5,6213	4,1158	4,1067	3,4304	2,8024
Value-p of beta	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00386%	0,00402%	0,06028%	0,50727%
Medium Price	0,16436	94,97204	116,93918	10,32367	0,01133	0,02148	0,52338	0,16203	0,03877	0,15199
Brownian mean	0,1447%	0,3547%	0,2418%	0,3908%	0,4469%	-0,3345%	0,1445%	0,3097%	0,3615%	0,6863%
Brownian standard deviati	1,7478%	1,7578%	1,7986%	2,9063%	2,8259%	2,5667%	2,4446%	2,7535%	2,1486%	2,0538%

Table 10a. Estimated parameters for each one of the shares in the sample, considering the 11-day event window.

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Shares' code	FLCL5	GGBR4	ITSA4	POMO4	PLIM4	PRGA4	RAPT4	RHDS3	SBSP3	UGPA4	ELMJ4
Alfa of Regression	0,0010	0,0018	-0,0035	0,0015	-0,0098	-0,0006	0,0050	0,0035	0,0003	0,0019	0,0036
Beta of Regression	0,1250	0,8514	-0,2673	0,2050	1,5959	0,3796	0,0741	0,6165	0,9358	0,4218	0,1623
Statistic t of beta	0,5025	4,8677	-1,1239	1,7644	6,1478	3,3081	0,5170	1,6616	6,9007	3,8495	2,1007
Value-p of beta	61,53247%	0,00011%	26,10757%	7,76594%	0,00000%	0,09395%	60,51822%	9,66018%	0,00000%	0,01184%	3,56651%
Medium Price	0,00098	16,86556	2,94328	2,97500	6,52099	10,88935	0,00074	0,11432	0,10226	0,01647	2,10623
Brownian mean	0,1914%	0,3120%	-0,3504%	0,0903%	-0,6339%	0,0457%	0,5180%	0,5358%	0,1944%	0,2994%	0,3777%
Brownian standard deviati	3,5797%	2,4255%	2,8960%	1,7981%	3,8504%	1,9690%	2,3761%	4,6100%	2,1293%	1,6079%	1,4866%

Table 10b. Estimated parameters for each one of the shares in the sample, considering the 11-day event window.

Shares' code	ITAU4	BBDC3	BBDC4	BBAS3	BBAS4	BRKM5	CLSC6	CTNM4	DURA4	ETER3
Alfa of Regression	-0,0002	0,0004	-0,0015	0,0025	0,0031	-0,0015	0,0000	0,0017	0,0020	0,0051
Beta of Regression	0,7076	0,8668	1,0739	1,4368	1,4143	0,7950	0,8394	0,5840	0,3493	0,3843
Statistic t of beta	5,5001	6,0811	7,9474	6,3741	6,4352	5,7727	4,0636	3,8834	2,8273	2,9413
Value-p of beta	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00000%	0,00483%	0,01030%	0,46946%	0,32688%
Medium Price	0,16565	97,20640	118,85920	10,54682	0,01156	0,02095	0,52645	0,16176	0,03942	0,15743
Brownian mean	0,0835%	0,3909%	0,2714%	0,4800%	0,5320%	-0,3014%	0,0773%	0,0672%	0,2900%	0,5916%
Brownian standard deviati	1,7808%	1,7481%	1,8351%	2,9102%	2,8467%	2,5947%	2,4765%	2,6544%	2,0022%	2,0593%

Table 11a. Estimated parameters for each one of the shares in the sample, considering the 5-day event window.

Shares' code	FLCL5	GGBR4	ITSA4	POMO4	PLIM4	PRGA4	RAPT4	RHDS3	SBSP3	UGPA4	ELMJ4
Alfa of Regression	-0,0010	0,0025	-0,0028	0,0011	-0,0130	-0,0012	0,0044	0,0010	0,0017	0,0026	0,0039
Beta of Regression	0,1151	0,7743	-0,2631	0,2324	1,5861	0,3671	0,0556	0,7324	0,9392	0,4186	0,1388
Statistic t of beta	0,4151	4,4361	-1,0124	2,2069	5,5345	3,1608	0,3632	1,9757	6,4314	3,7068	1,6327
Value-p of beta	67,81050%	0,00092%	31,13351%	2,73207%	0,00000%	0,15734%	71,64368%	4,81885%	0,00000%	0,02100%	10,25239%
Medium Price	0,00099	17,37700	2,95941	3,00079	6,22840	10,86000	0,00076	0,11852	0,10348	0,01677	2,16180
Brownian mean	0,0332%	0,3371%	-0,2832%	0,0254%	-0,9740%	0,0110%	0,4733%	0,3062%	0,2786%	0,3360%	0,3974%
Brownian standard deviati	3,8348%	2,2968%	3,0767%	1,7550%	3,9083%	1,8903%	2,4589%	4,6313%	2,1776%	1,5843%	1,6241%

Table 11b. Estimated parameters for each one of the shares in the sample, considering the 5-day event window.